

CLAIMS

1. A polyester amide copolymer, comprising a copolymer of an aliphatic polyamide (A) and an aliphatic polyester (B), having a weight-average molecular weight of at least 40000, and containing at most 10 wt.% of a fraction having molecular weights of at most 10000.
2. A polyester amide copolymer according to Claim 1, having a crystal melting point of at least 100 °C .
3. A polyester amide copolymer according to Claim 1 or 2, which has been obtained through molten copolymerization of an aliphatic polyamide (C) and a monomer of the aliphatic polyester (B).
4. A polyester amide copolymer according to Claim 3, wherein the aliphatic polyamide (C) is polyamide 6.
5. A polyester amide copolymer according to Claim 3 or 4, wherein the monomer of the aliphatic polyester (B) comprises at last two species selected from the group consisting of an aliphatic dicarboxylic acid or aliphatic dicarboxylic acid ester (D), an aliphatic diol (E) and an alicyclic ester (F).
6. A polyester amide copolymer according to Claim 5,

wherein the monomer of the aliphatic polyester (B) comprises a combination of the aliphatic dicarboxylic acid or aliphatic dicarboxylic acid ester (D) and the aliphatic diol (E).

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7. A polyester amide copolymer according to Claim 1, comprising a copolymer of an aliphatic polyamide and an aliphatic polyester which is a ring-opening polymer of a cyclic ester, and having an inherent 10 viscosity of at least 0.7 dl/g.

8. A polyester amide copolymer according to Claim 7, wherein the aliphatic polyamide comprises polyamide 6.

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9. A polyester amide copolymer according to Claim 7 or 8, wherein the cyclic ester is ϵ -caprolactone.

10. A polyester amide copolymer according to any 20 one of Claims 7 - 9, having an average molecular chain length in polyamide block of 3 - 10, which is larger than an average molecular chain length in polyester block.

25 11. A polyester amide copolymer according to Claim 10, wherein the average molecular chain length in (poly)ester block is 1 - 2.

12. A polyester amide copolymer according to any one of Claims 7 - 11, having a melting point of at least 160 °C.

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13. A polyester amide copolymer according to Claim 12, showing a single crystallization temperature in a course of temperature increase from amorphous state.

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14. A shaped product of a polyester amide copolymer according to any one of Claims 1 - 13.

15. A shaped product according to Claim 14, in any one form of monofilament fiber, multifilament fiber, sheet film and injection-molded vessel.

16. A process for producing a polyester amide copolymer, comprising subjecting a mixture of an aliphatic polyamide (C) and a monomer of aliphatic polyester (B) successively to:

(1) a first step of reaction at 100 - 150 °C in the presence of a catalyst while distilling off a low-molecular weight fraction containing water or an alcohol to render the mixture in a substantially uniform state,

(2) a second step of polymerization of the mixture in

a uniform molten state at 150 - 300 °C , and

(3) a third step of oligomer removal and higher polymerization at 150 - 300 °C under a reduced pressure.

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17. A process for producing a polyester amide copolymer according to Claim 16, wherein a solid polymer once produced through the step (3) is again subjected to a oligomer removal and polymerization 10 step in a molten state in a temperature region of from its melting point to the melting point + 150 °C under a reduced pressure.

18. A process for producing a polyester amide 15 copolymer according to Claim 16 or 17, wherein the aliphatic polyamide (C) is polyamide 6.

19. A process for producing a polyester amide copolymer according to any one of Claims 16 - 18, 20 wherein the monomer of the aliphatic polyester (B) comprises at last two species selected from the group consisting of an aliphatic dicarboxylic acid or aliphatic dicarboxylic acid ester (D), an aliphatic diol (E) and an alicyclic ester (F).

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20. A process for producing a polyester amide copolymer according to Claim 19, wherein the

monomer of the aliphatic polyester (B) comprises a combination of the aliphatic dicarboxylic acid or aliphatic dicarboxylic acid ester (D) and the aliphatic diol (E).

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21. A process for producing a polyester amide copolymer, comprising: holding a mixture of an aliphatic polyamide, an aliphatic polyester which is a ring opening polymer of a cyclic ester, and a cyclic ester or cyclic amide in a heated molten state at a temperature between a melting point of the polyamide and ca. 300 °C to proceed with an ester-amide exchange reaction until a transparent state is assumed, and then proceeding with polycondensation at a lower temperature.

22. A process for producing a polyester amide copolymer according to Claim 21, wherein the aliphatic polyamide is polyamide 6, the cyclic ester is ϵ -caprolactone, and the cyclic amide is ϵ -caprolactam.